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Marion B. Cherry
Gallatin National Forest
P.O.Box 130
Bozeman, MT 59771
406/587-6739

THE BLACK-BACKED AND THREE-TOED WOODPECKERS: LIFE HISTORY, HABITAT USE, AND MONITORING PLAN

Marion B. Cherry, Gallatin National Forest, P.O. Box 130, Bozeman, MT 59771

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INTRODUCTION

The black-backed woodpecker (Picoides arcticus), occasionally referred to as the Arctic or black-backed three-toed woodpecker, is found only in North America, while the similar northern three-toed woodpecker (P. tridactylus) is circumpolar (Table 1). Both species are found only in the northern hemisphere and have three toes rather than the more common four toes (for woodpeckers), a unique body posture and adaptations for foraging, and a yellow crown patch on the males. These two species are members of the Family Picidae, the subfamily Picinae, and the genus Picoides. Both species are medium-sized at 20-25 cm in length, with the black-backed woodpecker being slightly larger. The black-backed woodpecker has a black back as its name implies, while the three-toed woodpecker has a white patch (in the Rocky Mountains) or a mottled patch (more common) on its back. They are both have a white belly, breast and throat and white barring on their sides (Peterson 1990). Both species are monogamous, and there is sexual dimorphism in body size, with the male being slightly larger than the female.

Black-backed woodpeckers generally use habitat that has one or more species of pine (Pinus spp.), true firs (Abies spp.), spruces (Picea spp.), Douglas fir or hemlock (Tsuga spp.) or larch (Larix spp.). The three-toed woodpecker is generally found at slightly higher elevations and in slightly more northern locations than the black-backed woodpecker. The northern three-toed woodpecker's range in

North America exactly overlaps that of spruce (Picea spp.) while the distribution of the black-backed woodpecker in North America is very close to, but not exactly matching that of the boreal and montane conifer forest (Bock and Bock 1974).

Both black-backed and three-toed woodpeckers selected for single-storied mature or overmature sawtimber stands, and the estimated sizes of home ranges appeared to be related to the proportion of unlogged area within the home range (Goggans et al. 1987, Goggans et al. 1988).

Table 1. Comparison between black-backed and three-toed woodpeckers (references in parentheses).

	Black-backed Woodpecker	Three-toed Woodpecker
Distribution	No. America only	No. hemisphere, circumpolar
Habitat	boreal and montane conifer forest where beetle outbreaks are occurring (1)	sympatric with spruce (Picea spp.) where beetle outbreaks are occurring (1)
Feeding	excavating (pecking, drilling)(2,6,8)	scaling (6,11)

Technique		
Primary Food	wood-boring beetle larvae Cerambycidae (6)	bark beetle larvae Scotlytidae (6)
Foraging Location	tree trunks (3,4,8,12) logs on ground (5,11) tree trunk base (3,4,11)	tree trunk (4)
	trees 34 cm dbh (2) trees 37.5 cm dbh (3) trees 30-50 cm (9)	39 cm dbh (4) 20-50 cm dbh (9)
Nesting Location	tree > or = 35 cm dbh (9) tree ave. 37 cm dbh (2) 27.5 cm dbh (3) 30.5 cm (10)	30 cm dbh (21.5-38.2 cm range) (9) 30.5 cm dbh (10) 27.5 cm dbh (20-32.5 cm range) (7)
	nest height 3.7 m (2.4-16 m range)(9) ave. 6 m (2) ave. 1.8 m (10)	ave. 7.5 m nest height (4) ave. 4. m (10)
Roost Location	ave. 27.5 cm dbh and 6.3 m height in and around tree deformities (not cavities) in denser stands (3,4)	tree cavities in denser stands (3,4)
Summer Home Range Size	72-328 ha (3,4)	52-300 ha (3,4)
Territory Size	estimated 14.2-42.9 ha (10)	14.2-42.9 ha (10)
Woodpecker Management Area Recommendation	382 ha minimum (3)	211 ha minimum (3)

References for Table 1.

1. Bock and Bock 1974
2. Bull et al. 1986
3. Goggans et al. 1987
4. Goggans et al. 1989
5. Hoffman, pers. comm. 1993
6. Murphy and Lehnhausen. unpubl.
7. Sparks. unpubl.
8. Spring 1965
9. Steeger, et al. 1996
10. Thomas 1979
11. Villard 1994
12. Villard and Beninger

Although nonmigratory, the black-backed woodpecker seems to move locally in response to temporary abundance of food. These movements have been called irruptions (Bent 1939). These movements can be in response to timber that has been disturbed by fire, wind or insects where beetles are abundant. Yunick (1985) reported irruptions of black-backed and three-toed woodpeckers in eastern North America. He believes that the black-backed woodpecker is much more irrruptive than the three-toed, and that irruptions in three-toed woodpeckers and black-backed woodpeckers do not appear to be synchronous. In the northeast in the 1950's and 1960's these species frequented urban areas where Dutch elm disease was occurring (accompanied by its vector the Scolytus beetle, West and Speirs 1959).

Where the black-backed woodpecker is found in Oregon and Washington, its distribution has been described as having voids or discontinuities (Marshall 1992). Distribution elsewhere is probably also patchy given the transitory nature of the foods that they prefer. Forests would have to have some insect infestation for these to woodpecker species to use them as habitat, and preferably the large insect outbreaks that follow fire, flood, windthrow or disease.

PROBLEM STATEMENT

The black-backed woodpecker is listed as a sensitive species in Region 1 of the USDA Forest Service (which includes Montana and northern Idaho). This means that there is concern that this species could become listed as threatened or endangered under the Endangered Species Act at some time in the future. Some species are listed as sensitive because of the lack of information existing on them. The National Forest Management Act mandates that Forests maintain viable populations of all native species. Little has been done to inventory or monitor this species in southwest Montana. According to Skaar (1992), the black-backed woodpecker and northern three-toed woodpecker are found in western Montana, with the three-toed having a slightly larger range than the black-backed in Montana and more direct evidence of breeding. Both species occur on the Gallatin National Forest in southwestern Montana during the breeding season, but are not known to winter on the Forest. The evidence of the black-backed woodpecker's presence in this part of Montana is more incidental with less direct evidence of breeding than the three-toed woodpecker.

It is the purpose of this paper to examine the life history of the black-backed and three-toed woodpecker, to gain an understanding of their similarities and differences, the niches they occupy, and to use this information to develop a monitoring plan for the black-backed woodpecker in this part of Montana.

LITERATURE REVIEW

Foraging

Black-backed and three-toed woodpeckers are adapted for drilling or pecking. They have a heavier bill than other woodpecker species, and their three-toed feet allow them to hold themselves farther from the tree trunk and thus deliver harder blows to the bark than other woodpecker species (Goggans et al. 1987). However, they are not as adept as other woodpecker species in climbing and clinging abilities on trees, therefore, they often feed on the same general location on a tree for longer periods of time (Spring 1965). Types of foraging techniques encountered in the literature for these two species primarily included drilling or pecking (excavating), bark flaking or scaling (to get to the insects in superficial bark), and gleaning (searching over the surfaces of the tree) (Bull et al. 1986).

Black-backed woodpeckers spend the vast majority of their feeding time excavating (Spring 1965, Bull et al. 1986). Villard (1994) found that the three-toed woodpeckers scaled bark as their major foraging technique while the black-backed woodpeckers excavated more often. These findings seem to fit with the difference in feeding niches recently documented by Murphy and Lehnhausen (unpubl).

Murphy and Lehnhausen (unpubl.) found that black-backed woodpeckers foraged primarily on wood-boring beetle (Cerambycidae) larvae. Their predominate method of foraging was excavation, the only way to extract larvae from sapwood. Three-toed woodpeckers foraged mostly on bark beetle larvae (Scotlytidae) and only on wood-boring beetles that were in their first instar (located in the cambium layer). They primarily foraged by pecking or flaking, which is the best method to reach the larvae in the cambium. Bark beetles live in the bark cambium, while wood-borers penetrate the sapwood after the first summer. Beetle egg laying occurred at high densities only in the summer of the fire. Both types of beetles emerge 2 to 3 years post-fire. This helps to account for reports that black-backed woodpeckers respond quickly to burned areas but stay only a few years. Early work indicating that both species of woodpeckers fed on wood-boring beetles may be incorrect. Beal (1911) conducted the first work on feeding habits of these species and has been widely cited for this information. Even Peterson (1990) states that both species primarily eat wood-boring beetles and both species foraging primarily by flaking bark, a somewhat incongruous arrangement. The work of Murphy and Lehnhausen (unpubl.) is important because it shows what appears to be a true feeding niche distinction between the two species of three-toed woodpeckers, while previous authors seemed to believe that their food habits and feeding habits had partial to complete overlap.

Wickman (1965) calculated that woodpeckers may eat up to 50 larvae per day that were each about 50 mm in length. The predation on these larvae is significant. It has been estimated that individual three-toed woodpeckers may consume thousands of beetle larvae per day, and insect outbreaks may attract a many-fold increase in woodpecker densities (Steeger et al. 1996). The ability of woodpeckers in to help control insect outbreaks may have previously been underestimated.

In some studies, black-backed woodpeckers appear to make very little use of logs and stumps for foraging (Spring 1965). The trunk of the tree was preferred for foraging, and the larvae of mountain pine beetles tend to concentrated on tree trunks near the ground (Goggans et al. 1987). Black-backed woodpeckers foraged at an average height of 27 cm (1 ft) above the ground (Goggans et al. 1988). Villard (1994), found in his study in the Canadian boreal forest, black-backed woodpeckers excavated mainly on logs on the ground and at the base of trees with large diameters while three-toed woodpeckers used higher strata and tree trunks with smaller diameters. Hoffman (pers. comm.) has also noted that black-backed woodpeckers in her study area in Idaho frequently feed on logs. Villard and Beninger (1993) found black-backed woodpeckers using tree trunks for foraging 100% of their time in a burned area. They attributed this to the likelihood of greater availability of insect prey in this area. It appears that location of foraging on the tree or on logs and stumps has to do with prey location which varies from study to study.

Bull et al. (1986) found black-backed woodpeckers foraging almost exclusively on ridges (97% of the foraging bouts).

The black-backed and three-toed woodpeckers selected for mature and overmature sawtimber , and dead trees were preferred for foraging (Goggans et al. 1987). Bull et al. (1986) found that foraging occurred in both live and dead trees. The black-backed woodpecker selected foraging trees that were either live or were Stage 1 snags 94% of the time. Stage 1 snags are recently dead trees which still contain beetle larvae (Goggans et al. 1988). Steeger et al. (1996) found that both species of woodpeckers fed in either live but dying trees or in hard snags in the very early stages of decay. Villard (1994) found that both species had a great propensity for using dead trees or tree substrates (88% for the black-backed and 95% for three-toed woodpecker).

Goggans et al. (1987) and Bull et al. (1986) found lodgepole pine was preferred for foraging by black-backed woodpeckers.

Black backed woodpeckers preferred foraging in trees of 34 cm (16.5 in) diameters breast height (dbh) and (63 ft) 19 m height (Bull et al. 1986). Goggans et al. (1987) found the mean dbh of trees used for foraging was 37.5 cm (15 in) and the mean dbh of trees in the lodgepole pine stands used for foraging was 35 cm (14 in). Steeger et al. (1996) found that both woodpecker species fed in trees from 20-50 cm (8-20 in) dbh.

Hogstad (1976) reported that the three-toed woodpecker in Norway has significant sexual dimorphism between the sexes with the most marked difference being in the length of the tail and tarsus, which are longer in males. He also found significant differences in feeding locations and techniques

during the winter between the sexes. Hogstad (1977) found that three-toed woodpeckers changed their foraging locations and techniques depending on the availability of food items and their location. Food is less abundant in the winter, and females foraged on smaller trees than those selected by males. He found that distribution of bark beetles decreased with height above the ground in the winter. It appears that foraging behavior in the three-toed woodpecker is seasonal, depending on the abundance and location of food. Winter may be a critical time for survival because not only is food less abundant, but foraging time is reduced due to having fewer daylight hours (Hogstad 1993). Winter foraging must be especially efficient, and it is likely that foraging patterns of competitors (in this case, males and females of the same species) would diverge more in the winter, while they could be more similar in times of abundant food. That appears to be the case in the three-toed woodpecker in Norway.

Villard (1994) noted little difference in feeding behavior between the sexes of both three-toed woodpecker species despite notable sexual dimorphism. However, he did find three-toed woodpecker males foraged more on larger diameter trees than female three-toed woodpeckers. Villard (1994) did not believe that competition between the two woodpecker species was significant. Murphy and Lehnhausen (unpubl.) reported foraging behavior of male hairy woodpeckers (Picoides villosus) and female black-backed woodpeckers to be quite similar following a fire in Alaska. The black-backed woodpeckers seem to be readily displaced from their foraging location by hairy woodpeckers in this study (Villard and Beninger 1993).

Nesting

Black-backed woodpeckers excavate their own cavities in trees for nesting. Therefore, they are referred to as primary cavity nesters, and they play a critical role in excavating cavities that are later used by many other species of birds and mammals that do not excavate their own cavity (secondary cavity nesters). Black-backed woodpeckers peel bark away from the entrance hole and excavate a new cavity every year. Other woodpeckers sometimes take over their cavities (Goggans et al. 1987).

In northeast Oregon, black-backed woodpeckers excavate their nest cavity from 7 May to 7 June, incubate from mid-May to the third week of June, and feed young from June 20 to July 30. They have an average clutch size of four. Breeding season appears to be tied to elevation (Goggans et al. 1987). On the Targhee National Forest in eastern Idaho, Hoffman (pers. comm.) believed that excavation occurred between May 31 and June 30 at elevations of 1830 m to 2500 m (6100 to 8300 ft).

Incubation lasts from 12-14 days in both species, and the young fledge about 25 days after hatching (Peterson 1990). In the three-toed woodpecker, the young stay with the adults an additional 4-

8 weeks after hatching (Peterson 1990). This is probably about the same for the black-backed woodpecker. Both sexes incubate and care for the young (Peterson 1990).

According to Steeger et al. (1996), black-backed woodpeckers select trees greater than 35 cm (14 in) dbh in which to excavate a cavity, while three-toed woodpeckers selected slightly smaller trees averaging 30 cm (12 in) dbh (minimum range of 21.5 to 38.2 cm or 8.6-15.3 in dbh) and from 14.6 to 26.1 m (39.4-70.5 ft) in height for their nest cavity tree. Goggans et al. (1987) found average nest height to be 3.7 m (10 ft) with a range of 2.4 to 16 m (6.5-43.2 ft). Bull et al. (1986) found average nest height to be 6 m (19 ft). The diameter of trees chosen for nesting was relatively small with a mean dbh of 37 cm (15 in) and diameter at the nest of 30 cm (12 in). This is the smallest of any woodpecker species in this study. Goggans et al. (1987) found nest tree dbh to be 27.5 cm (11 in) for black-backed woodpeckers. For three-toed woodpeckers, Sparks (unpubl.) found the average dbh of the Douglas-fir was 27.5 cm (11 in) and 6.9 m (23 ft) in height with a range of 20-32.5 cm (8-13 in) and 2.4-15 m (8 to 50 ft). Three-toed woodpeckers used the smallest snags of any woodpecker in the study which included the hairy woodpecker, Williamson's sapsucker (Sphyrapicus thyroideus) and northern flicker (Colaptes auratus) (Sparks unpubl.). Thomas et al. (1979) show a minimum tree dbh of 30.5 cm (12 in) for both species and a minimum nest height of 1.8 m (6 ft) for the black-backed and 4.6 m (15 ft) for the three-toed woodpecker.

A number of tree species were used for nesting (Goggans et al. 1987). Bull et al. (1986) found that black-backed woodpeckers nested in ponderosa pine 67% of the time and in lodgepole pine 27% of the time. Sparks (unpubl.) reported on nine active nests for three-toed woodpeckers in the Bridger mountains of Montana. The most commonly used species for nesting was Douglas-fir, with some use of subalpine fir and limber pine. Beetle epidemics typically occur in lodgepole pine stands older than 80 years, which are also where three-toed woodpeckers are often found to nest (Toone 1992). However, in some studies, three-toed woodpeckers have been found to be more abundant in spruce and spruce-fir stands (Toone 1992). Three-toed woodpeckers preferred lodgepole pine for nesting while others bird species chose other tree species (Lester 1980).

Both woodpecker species use live or dead conifers (Steeger et al. 1996). Black-backed woodpeckers will nest in either live or dead trees (Bent 1939, Goggans et al. 1987). Bull et al. (1986) and Goggans et al. (1987) found that dead trees that had died recently were selected. In Sparks' (unpubl.) study, three-toed woodpeckers used primarily `hard' snags in the early stages of decay nesting most often along forest edges, in clearcuts and in selection cuts. Bull et al. (1986) hypothesized that ponderosa pines have thicker sapwood layers, and that the sapwood decays more rapidly in dead pines than other trees so that less effort is needed to excavate a nest in ponderosa pine than some other species. Goggans et al. (1987) believed that black-backed woodpeckers actually require trees with heartrot for nesting because their physiological adaptations for feeding leave them poorly adapted for building cavities. Both species are thought to excavate their cavities primarily in sound wood (Thomas et al.

1979). There appears to be disagreement on the soundness of trees used by these two species of woodpeckers for cavity excavation.

Goggans et al. (1987) found that 11 of 35 black-backed woodpecker nests were in areas of frequent human activity. All of the nests in this study were in lodgepole pines. Forty-nine percent of the nests were in undisturbed stands, 26% were in stands used for firewood cutting, and 26% were in logged areas. Black-backed woodpeckers can apparently nest in open, cut or burned stands as well as in undisturbed stands (Goggans et al. 1988). Sparks (undated) also found nesting of three-toed woodpeckers in areas affected by timber harvest.

Black-backed woodpeckers selected mature and overmature stands for nesting and also selected multistoried stands over single storied stands (Goggans et al. 1987). Black-backed woodpeckers seem to have a broad tolerance level for canopy closure and density of stems (Goggans et al. 1988). Thomas et al. (1979) comment that both the black-backed and three-toed woodpecker prefer snag clumps for nesting.

Lester (1980) reported that the home ranges of many woodpecker species can overlap. He found three-toed woodpeckers, downy woodpeckers (Picoides pubescens), hairy woodpeckers, pileated woodpeckers (Dryocopus pileatus), black-backed woodpeckers, Williamson's sapsuckers (Sphyriapicus thyroideus), red-breasted sapsuckers (S. ruber), red-naped sapsuckers (S. nuchalis). and northern flickers could all nest near one another. He believed that competition for nest trees was insignificant (Lester 1980). Home range overlap among different pairs of three-toed woodpeckers is virtually nonexistent (Goggan et al. 1988). Goggans et al. (1987) found no home range overlap between non-mates in the summer. Black-backed woodpeckers defended their home ranges against other black-backed woodpeckers but not against ot her bird species, including other woodpeckers.

Roosting

Little information is available on roosting behavior. However, through radtiotelemetry, Goggans et al. (1987) were able to shed light on roosting in the black-backed woodpecker. Black-backed woodpeckers roosted at night in and around tree deformities rather than in cavities. These deformities included concave western gall rust cankers, deep trunk scars or indentations, and mistletoe clumps. Mature and overmature trees were selected for roosts. The mean dbh of roost trees was 27.5 cm (11 in) and roost height was 6.3 m (21 ft) above the ground. Roost sites are probably selected to provide thermal cover and hiding cover from predators (Goggans et al. 1988). Roost stands had a high number of small trees and relatively closed canopies which may be thermally efficient as well as keeping nocturnal avian predators from being able to maneuver effectively in the stand (Goggans et al. 1988).

Demographics

Little demographic data currently exists in the literature for these species. Clutch size for both species averages 4 with the black-backed ranging from 2-6 and the three-toed ranging from 3-6 (Peterson 1990). Both species have only one brood per year (Peterson 1990). The success rate of nests monitored in Goggans et al. (1987) study was 63%. Renesting ability was not mentioned in the literature. Both species are monogamous, and the three-toed woodpecker has evidence of the pair bond lasting more than one year (Peterson 1990).

Through radiotelemetry, Goggans et al. (1987) found summer home ranges (after young had fledged or the nest failed) to be 72 to 328 ha (180-820 A). They estimated that it takes 193 ha (483 A) of which 59% is mature or overmature to support one black-backed woodpecker in this part of the summer. The larger home ranges included portions that were logged. However, it is important to note that there are no data on year around home ranges, when the food supply is more limited.

The northern three-toed woodpecker territory size was given as 14.2-42.9 ha (32-106 A), and that there can be up to about 3 pairs per 100 ha (about 1/100A) with each pair excavating up to 3 cavities per year (Thomas et al. 1979). At the time of their work, little information was available on black-backed woodpeckers, so they used the same numbers as those for tree-toed woodpeckers.

Thomas et al. (1979) estimated the number of snags required per 100 ha to support various percentages of maximum woodpecker populations. Their numbers for three-toed and black-backed woodpeckers are the same. In all forested habitats in which these species occur, it was estimated that one would have the largest black-backed or three-toed woodpecker population possible (100% capacity) on 100 ha if one retained 145 snags with a dbh of 30.5 cm (12 in) . This is a snag retention rate of 1.45 snags per ha (0.59 per acre). To have 80% of woodpecker capacity one would retain 116 snags per 100 ha (1.16/ha or 0.47/A) and for 60% one would retain 87 snags per ha (0.87/ha or 0.35/A). The total number of snags of different dbh's to retain in different types of forests depends on the compliment of woodpecker species present and their specific needs for certain sized trees. For example, in the Thomas et al. (1979) report, in order to maintain 100% of maximum woodpecker populations in the lodgepole pine and subalpine fir communities, it was recommended to retain 145 snags greater than 30.5 cm (12 in) dbh and 301 snags greater than 25.4 cm (10 in) dbh per 100 ha (or 59 and 121 snags/100 acres, of those dbh's, respectively). This equates to 1.45 snags of greater than 30.5 cm dbh and 3.01 snags greater than 25.4 cm dbh per ha (.59 and 1.21 snags/acre of those respective dbh's).

Although bark beetle populations are low between outbreaks, susceptible trees in the forest succumb and patches of trees are killed. Although not abundant, this is probably how foraging habitat exists for the three-toed woodpeckers between irruptions of bark beetles (Goggans et al. 1988).

Murphy and Lehnhausen (unpubl.) suggest that the population growth rate (l) may be greater

than 1 during the 2 or 3 years that black-backed woodpeckers are using a recent burned area. If fires are frequent enough, black-backed woodpeckers can move from one burn to another and populations can increase. Annual variability of fires is high, both in occurrence and size. Populations of black-backed woodpeckers may decline ($l < 1$) in unburned forest.

MANAGEMENT IMPLICATIONS, RECOMMENDATIONS AND MONITORING PLAN

Woodpeckers play critical roles in the forest ecosystem. Woodpeckers are primary cavity nesters that excavate at least one cavity per year, thus making these sites available to secondary cavity nesters (which include many species of both birds and mammals). Black-backed and three-toed woodpeckers can play a large role in potential insect control. The functional roles of these two woodpecker species could easily place them in the `keystone' species category-a species on which other species depend for their existence.

Black-backed and three-toed woodpeckers occupy unique and narrow foraging niches and cannot take advantage of other foraging options. Raphael and White (1984) found the black-backed woodpecker to be one of the four most restricted of the 18 cavity nesters they studied in the Sierras.

The black-backed woodpecker appears to fill a niche that describes everything that foresters and fire fighters have attempted to eradicate. For about the last 50 years, disease and fire have been considered enemies of the `healthy' forest and have been combated relatively successfully. We have recently (within the last 10 to 15 years) realized that disease and fire have their place on the landscape, but the landscape is badly out of balance with the fire suppression and insect and disease reduction activities (i.e. salvage logging) of the last 50 years. Therefore, the black-backed woodpecker is likely not to be abundant as it once was, and continued fire suppression and insect eradication is likely to cause further decline. The black-backed woodpecker occurs at lower elevations where timber harvest has often been the heaviest due to accessibility. Protected areas, like Wilderness areas, are often higher than the elevation range of the black-backed woodpecker. Salvage logging that often follows fire removes potential food resources. Salvage logging often occurs in wind damaged stands as well.

Goggans et al. (1986) believed that snag retention at the 60% level may not be good enough for the black-backed woodpecker. Snag retention at the 60% level, which has been thought of as adequate in some locations, may be ineffective for these two species. This is because snags provide considerably more than just nesting habitat for these species. For these species, they are important for foraging. Snags need to be managed in the context of the forest in which they occur and not managed as one habitat requirement (Goggans et al. 1987). Sparks (undated) cautioned against saving only large snags on the premise that larger snags satisfy the needs of all cavity nesting species, because some species like the three-toed woodpecker actually prefer smaller dbh snags and apparently will not use large dbh trees for nesting.

Goggans et al. (1987) recommended establishment of woodpecker management areas, because the types of habitats this species utilizes are often targets for salvage or other logging. They suggested a minimum area for a pair of black-backed woodpecker as 382 ha (956 A) of lodgepole or pine-dominated habitat in mature or overmature state. Fragmentation should be minimized so that the 382 ha are as contiguous as possible and are at least interconnected. They also recommended woodpecker management areas of 210 ha (528 A) for three-toed woodpeckers. These management areas should be at the proper elevations for the area under consideration and may overlap for the two species.

Information provided to Forests in the Northern Region (unpubl). stated that suitable unburned habitat for the black-backed woodpecker consisted of areas below 1350 m (4500 ft) elevation on the west of the Continental Divide and less than 1800 m (6000 ft) on the east of the Divide. Once a fire or other disturbance occurs in these areas that brings in insects, black-backed woodpeckers may use areas higher than these elevations. These guidelines suggest retaining 50% of burned acres when less than 2,000 ha (5,000 A) have burned and to leave 40% of burned areas with 2,000-4,000 ha (5,000-10,000 A) have burned, and leave 30% of areas over 4,000 ha (10,000A). They suggest leaving large blocks. For primary feeding and nesting habitat (summer), these guidelines recommend providing 60-120 ha (150-300 A) per pair of insect killed mature or old growth trees with nest trees about 42.5 cm (17 in dbh) (live and dead with heartrot), leaving forage trees dead less than 5 years of 17.5 to 30 cm (7-15 in) dbh, in Douglas fir, ponderosa pine, lodgepole pine, and larch and possibly spruce. Secondary feeding habitat can be other tree species, early post-fire or insect killed mature or old growth, 30-60 ha (75-150 A) per pair with the same dbh trees for nesting and foraging as above. A draft of further information provided to Forests in Region 1 (unpubl.) revised preferred habitats to be the 600-1800 m (2000-6000 ft) west of the Divide and 1200-2100 m (4000-7000 ft) east of the Divide and in both cases suitable habitat was raised to 2250 m (7500 ft) elevation. Given the literature review, the area per pair seems low and the diameter of trees for nesting seems high in these recommendations. In addition, the elevation to be considered east of the Continental Divide may not extend high enough.

Murphy and Lehnhausen (unpubl.) suggest that salvage logging should be delayed several years post-fire to allow for use of the burns by black-backed woodpeckers.

Management Recommendations for Black-Backed Woodpeckers

1. Allow fire and insects to resume a more natural role in the forest ecosystem. Allows woodpeckers to resume a role in biological insect control. (Decrease fire suppression and insect and disease control activities.)

2. Protect areas at lower elevations for woodpecker habitat. (Wilderness areas are often at too high elevations, and timber harvest has been heavy in places at lower elevations where this species may occur.)

3. Postpone salvage logging operations until at least 3 years post fire, flood, or insect outbreak. If harvest begins prior to this time, retain large portions of the dead trees and dying uncut.

4. Leave as many snags as possible (60% should be considered a bare minimum for species viability). Retain snags of the correct dbh's for feeding and cavity trees. According to the literature, foraging trees for black-backed woodpeckers range from 20 to 50 cm (Steeger et al. 1996) with two studies finding a mean of 34 and 37.5 cm, respectively (Bull et al. 1986 and Goggans et al. 1987). Goggans et al. (1987) also noted that the mean dbh of trees in the foraging stand was 35 cm. Nesting trees for black-backed woodpeckers were found to be 35 cm or greater (Steeger et al. 1996) with means of 37 cm (Bull et al. 1986) and 27.5 cm (Goggans et al. 1987) found in two studies. Sparks (unpubl.) suggested that the snag `rule of thumb' that the bigger the snag, the more species will use it may be incorrect, and that woodpeckers may be selecting a specific size tree and cannot use one much smaller or will not use one larger in dbh.

5. Retain clumps of snags (Thomas et al. 1979).

6. At a minimum, until local data are available, protect areas of 382 ha (956 A), with minimal fragmentation, for nesting territories in appropriate habitats (pine dominated mature or overmature forest) from 1200 m to 2400 m (4000 to 8000 ft) elevation east of the Continental Divide.

7. Gather local information on the presence of this species.

Research Needs

There is a lack of population and demographic data on black-backed woodpeckers. The Breeding Bird Survey is unlikely to ever be able to count enough of these species to be utilized for trend information (Marshall 1992). There is no information on home ranges other than for the short, summer period (Goggans et al. 1987), while the winter period of less abundant food is likely to be more critical for survival. Almost no inventory and monitoring has occurred in this area of southwest Montana. There is a need to gather information on where black-backed woodpeckers are feeding in burned areas to determine if large burned areas or smaller, patchy burns are preferred for foraging.

Monitoring Plan

Inventory and monitoring of northern three-toed and black-backed woodpeckers has occurred in several recent studies using similar techniques with a high degree of success (Goggans et al. 1987, 1989; Toone 1992; Hoffman unpubl.).

On the Gallatin National Forest, we are primarily interested in locating the black-backed woodpecker because it is a Forest Service sensitive species in this Region. We will also record other woodpeckers that are encountered during the survey. Based on methods others have utilized, the following is the protocol I would establish for surveying for black-backed woodpeckers on the Gallatin National Forest.

1. Concentrate surveys from June 1 through June 30 (period of nest excavation).
2. Conduct inventory in habitats selected for suspected occurrence of black-backed woodpeckers (i.e. recently fire killed or insect killed stands of conifers). If there are timber salvage projects planned in an area, give these areas highest priority for survey.
3. Play a recorded tape of black-backed woodpecker drumming at stations 500 m apart.
4. At each stop, play drumming tape for 30 sec intervals 8 times, alternating the drumming tape and listening for 30 sec each. This will allow the surveyor to play the drumming tape in each of the 4 ordinal directions 2 times each.
5. Begin survey route 1/2 hour post sunrise and continue to 5 hours post sunrise. Determine if response declines over time to decide if monitoring later in the day attains results comparable to early surveys. Use the Montana Natural Heritage field form for rare species locations to document any occurrence (see attached).
6. For areas where timber salvage is planned, return to the area at least one additional time during the excavation period for inventory.
7. Attempt to locate nest trees if black-backed woodpeckers are encountered. Propose mitigation measures to protect important locations for black-backed woodpeckers.

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TABLE 1. COMPARISON BETWEEN BLACK-BACKED AND THREE-TOED WOODPECKERS (REFERENCES IN PARENTHESES).

	BLACK-BACKED WOODPECKER	THREE-TOED WOODPECKER
DISTRIBUTION	NO. AMERICA ONLY	NO. HEMISPHERE, CIRCUMPOLAR

HABITAT	BOREAL AND MONTANE CONIFER FOREST WHERE BEETLE OUT-BREAKS ARE OCCURRING	SYMPATRIC WITH SPRUCE WHERE BEETLE OUTBREAKS ARE OCCURRING (1)
FEEDING TECHNIQUE	EXCAVATING (2,6,8) (PECKING, DRILLING)	SCALING (6,11)
PRIMARY FOOD	WOOD-BORING BEETLE LARVAE CERAMBYCIDAE (6)	BARK BEETLE LARVAE SCOTLYTIDAE (6)
FORAGING LOCATION	TREE TRUNKS (3,4,8,12) LOGS ON GROUND (5,11) TREE TRUNK BASE (3,4,11)	TREE TRUNK (4)
	TREES 34 CM DBH (2) TREES 37.5 CM DBH (3) TREES 30-50 CM (9)	39 CM DBH (4) 20-50 CM DBH (9)
NESTING	TREE > OR = 35 CM DBH (9) AVE. 37 CM DBH (2) 30.5 CM (10) 27.5 CM DBH (3)	30 CM DBH (21.5-38.2 CM RANGE) (9) LOCATION TREE 30.5 CM DBH (10) 27.5 CM DBH (20-32.5 CM RANGE) (7)
	NEST HEIGHT 3.7 M (2.4-16 M RANGE) (9)	AVE 7.5 M NEST HEIGHT (4)
	AVE. 6 M (2) AVE. 1.8 M (10)	AVE. 4. M (10)

	BLACK-BACKED WOODPECKER	THREE-TOED WOODPECKER
ROOST LOCATION	AVE. 27.5 CM DBH AND 6.3 M HEIGHT IN AND AROUND TREE DEFORMITIES (NOT CAVITIES) IN DENSER	TREE CAVITIES IN DENSER STANDS (3,4)

	STANDS (3,4)	
SUMMER HOME RANGE SIZE	72-328 HA (3,4)	52-300 HA (3,4)
TERRITORY SIZE	ESTIMATED 14.2-42.9 HA (10)	14.2-42.9 HA (10)
WOOD-PECKER MANAGEMENT AREA RECOMMENDATION	382 HA MINIMUM (3)	211 HA MINIMUM (3)

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THE BLACK-BACKED AND THREE-TOED WOODPECKERS: LIFE HISTORY, HABITAT USE, AND MONITORING PLAN

I. INTRODUCTION

II. PROBLEM STATEMENT

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